

Seed production has been initiated on Spartan hard fescue, Citation II perennial ryegrass, Omega II perennial ryegrass, and Repell perennial ryegrass. These varieties used germ plasm obtained from the New Jersey Agricultural Experiment Station in their development.

Nearly 3000 new turf evaluation plots of Kentucky bluegrass, perennial ryegrass, fine fescue, and tall fescue were seeded in September. The establishment of seven additional acres of spaced-plant nurseries are being completed.

Resistance to sod webworms and billbugs was found to be associated with the presence of an endophytic fungus growing within the tissues of perennial ryegrass plants. This discovery should have important implications in plant breeding, seed production, seed labeling, and varietal evaluation. Programs have been initiated to utilize "Endophyte Enhanced Pest Resistance" in turfgrass breeding work. Preliminary observations indicate that endophytic fungi may also be involved in insect resistance in the fine fescues. Histochemical and other laboratory studies are being conducted to gain a better understanding of this method of resistance.

R=70609 U. S. DEPARTMENT OF AGRICULTURE - Dr. Jack Murray, Project Leader

Funds Granted \$4600 Varietal development of seeded zoysiagrass.

The zoysiagrass germ plasm collected in Southeast Asia during the summer of 1982 is still in plant quarantine due to an unknown disease. Considerable time this year has been spent studying the etiology of the unknown disease and methods of eradication. No additional collections were made.

Symptoms of three unidentified diseases were found among zoysia accessions in the greenhouse. Two are believed to be virus-caused while the third and most severe disease is suspected to be a bacterium. No virus particle could be found, and experimental results suggest that the virus disease is Biotic in origin. The scientists have not as yet been able to consistently transmit the bacteria-causing disease and artificially infect healthy zoysia. Therefore, the etiology of this disease remains unproven.

The diseases caused by the viruses are not spreading and affect only a small portion of the zoysia accessions. No attempts have been made to cure diseased plants. Experiments with various antibiotics to eradicate bacteria and achieve remission of symptoms in infected plants have been unsuccessful. Preliminary experimental results using hot water treatments of nodes to eradicate the disease are promising. With one of the heat treatment schedules, symptoms did not reappear in zoysia plants for four months after treatment. Test work and a refinement of methods of treatment using hot water continue and there is hope to eradicate the disease in all infected accessions.

Some zoysia accessions have not shown symptoms during more than a year of exposure to infected plants in the greenhouse. If these plants prove to be resistant to the disease they will not be subject to eradication experiments.

Additional data were collected on field nursery and evaluation plots of zoysia selections established in 1980 and 1981. In general, data for rust infection, drought tolerance, and turfgrass quality agreed with earlier data. Thatch accumulation was directly associated with plant density and leaf width. In general, Zoysia japonica selections were more drought tolerant than Zoysia matrella selections. However, after complete dormancy was reached this summer, the matrella selections greened up quicker following rain than japonica selections.

Two seed establishment studies were undertaken this summer. The first was to determine the effect of using straw or plastic mulch on seed germination and establishment. The other study is to determine the influence of mowing height and nitrogen levels on seedling establishment. Both studies will continue through next year.

R-70610
TEXAS AGRICULTURAL EXPERIMENT STATION - DALLAS - Dr. M. Engelke, Project Leader
 and

U. S. DEPARTMENT OF AGRICULTURE - Dr. J. Murray, Project Leader

Funds Granted \$5000 Maintenance of zoysia germ plasm collections.

An additional grant of \$2500 was made to each of the above institutions in August, 1983 in support of the zoysia germ plasm collections made throughout Southeast Asia in 1982. This support was deemed essential in view of the serious disease problem encountered with the zoysia collections. The funds were used for additional greenhouse maintenance and disease study.

GOLF SHOE STUDY - Bengueyfield, Gibeault* and Youngner*, Project Leaders

R-70611
 Funds Granted \$2000 Study of turfgrass wear caused by golf shoes.

With the introduction of new multi stud golf shoes in 1982, many complaints from club officials and golf course superintendents were received regarding the effect of these shoes on putting surfaces. This experiment was carried out at Industry Hills Golf Club after being developed and designed by Drs. Gibeault and Youngner at U C Riverside. The experiment was reported in detail in the September/October, 1983 issue of the USGA Green Section Record.

In summary, the exhaustive tests showed that the conventional spiked golf shoe caused the greatest amount of turfgrass damage and wear. The multi stud golf shoes caused medium turfgrass damage and wear. The "teaching" type golf shoe caused a very minimal amount of turf damage or wear. The above results were found on both 'normal' and 'wet' putting surfaces.

Putting quality was also tested under normal putting green conditions. This subjective test showed that the plots with the poorest putting quality ratings were those of the conventional spike golf shoe. The multi stud shoes and the teaching shoe received a much more favorable putting rating.

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